

Claims

What is claimed is:

1. A method for decoding a linear block encoded string of information bits comprising the steps of:
 - a. converting the string of information bits into a plurality of codewords, wherein each codeword has a length N ;
 - b. performing hard and soft decisions on each codeword in order to generate a hard decision vector h of length N and a soft decision vector c of length N ;
 - c. computing the syndrome of the hard decision vector h by using Galois Field Arithmetic;
 - d. finding the location of the two minimum values in the soft decision vector by the Galois Field Arithmetic and designating these locations as LOW1 and LOW2,
 - e. xoring the LOW1 and LOW2 with a $Nc1$ bit locations, wherein a $Nc2$ bit location is generated
 - f. swapping the soft decision value at location $Nc1$ with the soft decision value at location $Nc2$ for each nearby valid codeword computed;
 - g. determining which soft decision value sum is the lowest and designate this as Min1;
 - h. designating two bit locations which created Min1 as MinA and MinB;
 - i. designating the next lowest soft value sum as Min2;
 - j. replacing the value at bit location MinA with the value of Min2 minus the current value at bit location MinA,
 - k. replacing the value at bit location MinB in the soft decision vector with the value of Min2 minus the current value at bit location MinB;
 - l. subtracting the value of Min1 from the values in all other bit locations in the soft decision vector in order to generate an output codeword; and
 - m. 2's complementing all soft values in the output codeword at bit locations which correspond with bit locations in the hard decision vector having a 0 in their location and creating the new signed soft value vector.